## EXHIBIT D TO DECLARATION OF WILLIAM WARD





Freshwater Mussel or Clam?

Both mussels and clams are part of a larger group of aquatic animals known as "bivalves." This means they have two external shells. The difference between the two is that mussels must have a host species, such as a fish, to complete their life cycle; clams do not.

The Cassville Channel before you is famous among malacologists (mussel experts) because of its hidden secret. This is one of several locations on the Mississippi River where mussels still blanket the river bottom in what is known as a mussel "bed". Over 25 species of mussels can be found here, including the Federally endangered Higgin's eye pearlymussel. These mussels have been relocated to other areas to assist with re-establishmentment of mussel beds up and down the Mississippi River.

## Reproducing Naturally

- (1) The male mussel releases sperm into the river and the river current carries it to the female.
- (2) The fertilized eggs in the female are called glochidia (glo-kid-e-a) and must attach to a specific host fish's gill to survive.
- (3) For some mussels finding the right host fish involves deception. Some species wave a minnow-like lure and an unsuspecting fish takes the bait and the glochidia clamp on to the gills, literally hitching a ride.
- (4) They stay on the gill until they are mature enough to survive on their own.



Courtesy Missouri Department of Conservation

USFWS

## Mussels of the Mississippi

No other group of animals in North America is in such grave danger of disappearing. Mussels native to the Upper Mississippi River are losing ground to pollution, sedimentation, habitat alteration, and smothering from non-native zebra mussels.

Native mussels are critical to water quality as they anchor themsevles to the river bed and silently purify the water. Laying nearly motionless they become natural filters, purifying the water by feeding on algae, plankton, and silt particles. This makes them one of the few animals which actually improve water quality. These curiously named critters plain pocketbook, black sandshell - are food for refuge wildlife including otter, raccoon, muskrat, heron, egret, and some fish.

You can help native mussels by slowing the spread of zebra mussels. Check your boat and equipment, and remove any zebra mussels that have hitched a ride.



Native mussels can't run, and they can't hide. This mussel has been smothered by hundreds of the smaller zebra mussels.



Butterfly



Plain pocketbook



Blacksandshell



Higgin's eye pearlymussel

## River Refuge



The refuge is perhaps the most important corridor of fish and wildlife habitat in the central United States, an importance which has increased over time as habitat losses or degradation have occurred elsewhere.

A pair of bald eagles tending their young.

This special habitat was almost lost. In the early 1920s, a plan to dike and drain backwaters of the Mississippi River surfaced. One man, Will Dilg took action to save this precious habitat. In 1924, as president of the Izaak Walton League, he convinced Congress to create the Refuge. Today, it encompasses approximately 240,000 acres in a more-or-less continuous stretch of 261 miles of Mississippi River floodplain from. The seemingly endless panorama of river, backwaters, marshes, islands, and forest, framed by steep bluffs, makes the refuge a national scenic treasure; a place for wildlife to feed, rest, breed, and rear young.



